Light and LIGHTING

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contents

Lighting in June

GENERAL interest in artificial lighting tends to a minimum in June when the number of hours of daylight in this country is maximal. But daylight and the daylighting of building interiors are subjects which, from the inception of this journal, have never been ignored in its pages. Turning back these pages from this fiftieth volume to the first, we can point to no fewer than three contributions in Vol. I from that pioneer of the "science of daylighting," the late P. J. Waldram. In these contributions he dealt with the measurement of the "window efficiency" of rooms by determining what was subsequently termed the average daylight factor; with the photometric measurement of illumination for architectural purposes; and with the need—so often pointed out since—for co-operation between architects and lighting specialists. We may repeat what we said in February "that among the few countries in which daylighting has been and is being most scientifically and fruitfully studied we stand very high." June, however, has also its delights by man-made lighting; for now — if we are so minded—we can enjoy the spectacle of flood-lit buildings and the modern "fairy lights" that are so attractive a feature of many of our summer holiday resorts,

Notes and News

FROM time to time readers will no doubt have noticed in these columns views expressed by ourselves, our readers and our colleague " Lumeritas " on the subject of lighting terms. We have recently had quite warm discussions on " lighting " versus " illuminating engineering " ; only last month Stuart Lay made a present to the educator of the term " particular lighting " ; but the hardy annual, without any doubt, is " lumen per square foot " versus " foot-candle."

We will not go into all the arguments for and against the lm/ft²—though if the arguments go on much longer we shall take refuge in this journal in the " lux " and to blazes with the consequences. We have, however, recently been informed that the architect cannot grasp the lm/ft² and finds it convenient to abbreviate it to " lumen " ; he then wonders why he needs so many 5,000-lumen lamps to provide a 10 " lumen " installation. We don't consider that a good reason for returning to the foot-candle; when foot-candle was the current term it was shortened to " candle."

But a new suggestion has been whispered to us. Let us keep the lumen per sq. ft. as the unit, and let us take a well-known name and use it as the term. Let us, it is suggested, call it a " Walsh." Now don't you think that's a good idea ?

Colour Theory

Some of the speculations on the nature of colour and colour vision which preceded the formulation of the now accepted theories were recently discussed by the Colour Group. Goethe's ideas on the subject were described by M. H. Wilson, of the Goethean Science Foundation at Stourbridge, who said that Goethe always tried to put things in a larger context and looked for some underlying principle. In his " Farbenlehre " he expounded his idea that in the case of colour the basic principles were what he termed " polarity " and " intensification." The former found its clearest expression in the two opposing sets of " boundary colours " which could be noticed when a prism was placed over an edge, or boundary between darkness and light. These colours were shown by Mr. Wilson, not only as Goethe observed them but also in a variety of forms which, he said, followed logically from Goethe's way of thinking.

At the same meeting Dr. R. A. Weale, of the Institute of Ophthalmology, read a somewhat iconoclastic paper on " Trichromatic Ideas in the Seventeenth and Eighteenth Centuries." He first referred to a paper by the American research worker on colour vision, G. L. Walls, who had recently described his attempts to discover the earliest references to colour blindness. It appeared that these occurred in a pamphlet by a writer about whom very little was known. Even his name was in doubt; he was referred to by Helmholtz as Giros von Gentilly and as having written under the pseudonym of G. Palmer, but in fact it seemed very likely that his real name was Palmer and that the other name was the pseudonym. In any case, his pamphlet, which was published in 1777, had a good deal about a trichromatic theory of colour vision in it but nothing about colour blindness. This, however, was referred to in a later pamphlet which Palmer published in 1786, some 15 years before Thomas Young's famous lecture, usually regarded as the origin of the trichromatic theory of vision. Palmer's idea was that rays of light contained three components, one red, one yellow and one blue, in fixed proportions. In the retina there were three types of " elements " which responded to these three components of the light. The situation was rendered even more confused, said Dr. Weale, by the fact that the German research worker Seidl had traced the Russian Lomonosow as the first propounder, in 1756, of the trichromatic theory, while similar ideas were to be found in work by Mariotte in 1684. In view of all these facts it was interesting to speculate how much Young actually contributed to the theory associated with his name. Perhaps it would be safe to say that, although he did not originate the trichromatic theory, by his authoritative position he greatly hastened its acceptance. It was interesting to notice that, while in his original lecture he gave as the primaries the traditional red, yellow and blue, six or seven years later he changed them to the now universally accepted red, green and violet.

Designs of the Year

On May 10 Prince Philip visited the Design Centre to see a display of 12 products chosen as " Designs of the Year " from some 3,500 shown at the Centre during its first year of operation. Prince Philip also presented certificates to the manufacturers of the chosen products.

One of the 12 outstanding designs was the " Ovoid " pendant lampshade made by Rotaflex

(GB) Ltd. and designed by John and Sylvia Reid. These shades, of which there is a large and colourful range, have already attracted considerable attention both amongst lighting people and purchasers. Made from extruded cellulose acetate tubing wound on a shaped former and bonded together, they are light, durable and easily cleaned; the shapes and colours create interesting possibilities for decorative effects.

Our congratulations to Rotaflex and, not for the first time, to John and Sylvia Reid.

Sound and Light Spectacles

The first sound and light spectacle in this country is to be staged by permission of the Duke of Bedford at Woburn Abbey on August Bank Holiday and will run until September 21, Sundays and Mondays excepted. It is being organised by the Bedfordshire New Churches Appeal Committee; the title will be "The Story of Woburn"; lighting will be by Thorn Electrical Industries Ltd. Performances will take place in the late evening, probably about 9 p.m., though details have yet to be settled.

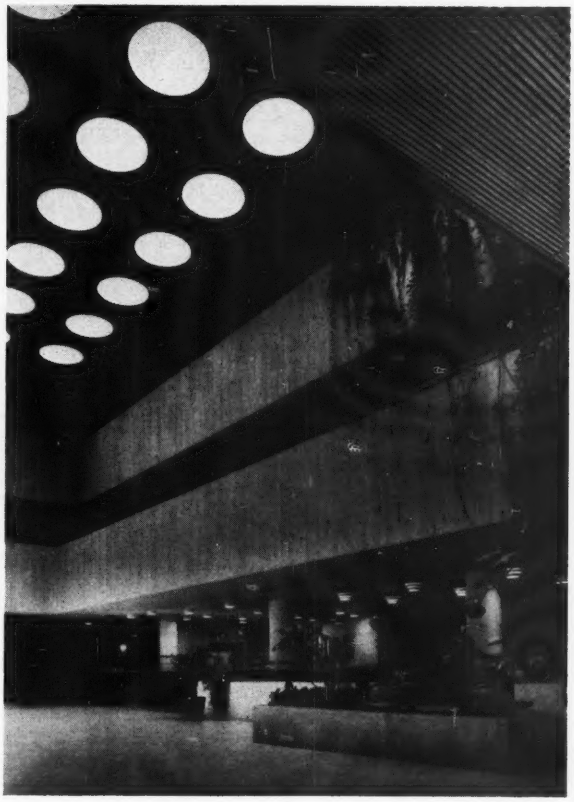
We are very glad to know that someone has had the courage, in the face of all the reasons that have been put forward for not staging such spectacles in this country, to take the plunge and we would congratulate all concerned with the Woburn venture, full details of which we hope to announce in due course.

Finnish Architecture

An aspect of building which surprises many visitors to the UK is our apparent fear of large windows. Logically, it is in hot, sunny lands that one expects to find small windows (as, indeed, one does in the Middle East), for windows let in heat as well as light. In those countries where the sun is welcomed rather than shunned one would expect windows to be as large as structural limitations will permit. From the exhibition of Finnish architecture held recently at the RIBA, it could be seen that the Finns accept this approach. (The reason for the Briton's contrary attitude is his traditional refusal to heat his buildings —particularly his home—to a degree sufficient to compensate for the extra heat loss.)

The importance of Finland's contribution to the development of modern architecture hardly needs stressing in these pages, but it is clear from the photographs at this exhibition that her architects cope with the lighting of their buildings with the same imagination and verve that they display in their handling of architectural composition and detail. The exhibition —the first comprehensive display of photographs of modern Finnish architecture to be assembled in this country—is probably the most outstanding show of its kind yet seen at the RIBA. It is now touring various provincial cities.

Architecture in Finland; two examples from the recent exhibition at the RIBA. Above, a chapel at Turku (Erik Bryggman); below, the 'Rautatalo' office building in Helsinki (Alvar Aalto).



The main gallery of the Department of Fine Art, Nottingham University.

The Lighting of an Office Building in Stockholm

By Torbjörn Ström

In the following article a Swedish lighting engineer describes how the lighting installation in an important office building in Stockholm—one of the first buildings in Sweden to be lit by fluorescent lamps—was modified during the first ten years of its service. He shows how the comments of the staff, experiments carried out on the premises, and the availability of new materials for the luminaires all played a part in making possible a greatly improved lighting scheme.

INSURANCE companies have, in many ways, pioneered the advance towards more efficient administrative techniques, including effective working methods, the introduction of mechanical aids, and the erection of premises designed specifically for their purpose. The opening in May, 1940, of Thule House, the 450-room headquarters of the Thule Group, in Sveavägen, Stockholm, marked a number of significant contributions to progress in this direction. Exhaustive research and much painstaking planning went into the building of this modern office block, which, equipped with the most up-to-date aids then available (many of them quite new in Sweden), attracted much well-merited attention. One of these innovations lay in the type of office lighting employed.

Fluorescent lamps were first shown to the public at an exhibition in New York in 1938. The Thule management quickly saw the advantages this new light source offered for the lighting of the modern office, and Thule House was one of the first office buildings in Sweden to be lit by fluorescent lamps.

The individual offices in Thule House are separated by glazed partitions. On most floors the corridor walls are also glazed. The large rooms, which are up to 30 ft. wide, made it desirable that the light should be evenly distributed, so that desks could be arranged without regard to the positions of the light sources. The choice of fully indirect lighting obviated the risk of reflections from polished desk-tops, papers, and machine surfaces, and from the glazed partitions. The ceiling fittings were in the form of upturned reflectors of enamelled steel sheet housing 40-watt fluorescent lamps. By means of loose leads at their ends the fittings were plugged into sockets mounted in the pelmets which conceal the venetian-blind suspension. The level of illumination was 110-125 lux*, which, at that time, was considered a high level. The first fluorescent lamps used were of the "daylight" type, but these were quickly replaced by "white" lamps.

In general, the lighting in Thule House was extremely good by comparison with other installations which were carried out at that time using bare fluorescent lamps without the slightest protection from dazzle. As time went on, however, complaints came from the staff that the light was too "weak," and that its "tone" was cold and flat. Individual table lamps were asked for. According to the critics, the even shadowless distribution of light which the fully indirect fittings gave produced an "impersonal" atmosphere. Moreover, certain suspicions were voiced against fluorescent lamps, it being rumoured that the light they gave could injure the eyes.

Readings taken towards the end of the 1940s showed that the illumination level was at least 20 per cent. below its original value. The explanation was simple: the upturned ceiling reflectors were first-class dust-traps, while the ceiling tiles had also become dirty, partly because of the air-conditioning. Of course, ceilings can be washed and light fittings can be cleaned, but in a building of this size such cleaning, which would be needed every three months, would be difficult to arrange and expensive. In addition, during the ten years which had elapsed illumination levels considered desirable had risen, and for general office work, 300 lux had become the accepted standard.

In 1949 tests were carried out to compare the existing lighting with that which would result from the use of different types of fitting, including the new fluorescent fittings with glass covers which, at that time, were coming on the market. In some rooms the reflectors which had provided the indirect lighting were simply turned downwards, giving direct lighting, with the result that glare was difficult to avoid and dazzle was experienced, being aggravated by the dark ceiling. Other indirect reflectors

* 10 lux is approximately 1 lm/ft^2

Top: typing pool, with fully indirect lighting troughs suspended from the ceiling. Each trough housed four 40-watt white fluorescent lamps. Above: similar troughs in a small office, reversed to give direct lighting and a higher illumination level. Clip-on steel louvres reduce glare.

housing single fluorescent lamps were replaced by twin lamp fittings. This procedure substantially raised the illumination level, but made the ceiling above the reflectors so bright that troublesome dazzle was experienced by those persons who had the reflectors in their field of view. Tests made with fittings with glass covers giving mainly indirect light showed that these, too, were unsuitable—for the same reason. Fittings with glass sides and metal louvres for dazzle suppression were found to be better in this respect, but when the glass sides were within the field of vision of the office staff dazzle was still experienced. Not until white enamelled metal or—best of all—opal plastics came into use did the lighting engineers feel justified in recommending predominantly direct lighting.

One of the main reasons for abandoning fully indirect lighting was the demand for more light—anything up to 300 lux—which, because of the poor efficiency of this system, would have been very expensive. Another drawback of fully indirect lighting is that the working surface is no more strongly lighted than other parts of the room and, in fact, receives appreciably less light than the ceiling. To make things as easy as possible for the eye, the working surface should be most strongly illuminated, and for people with extra-sensitive eyes the brightly lighted ceiling above the fully-indirect lighting reflectors has a distracting effect—they find it difficult to keep their eyes (and their minds) concentrated on the comparatively dark working surface.

Tests made in a typing pool showed that the level of illumination was totally inadequate, being only about 120 lux. The fittings in use were single-lamp pendant fittings with glass sides and metal louvres. They were first replaced by similar twin-lamp fittings, which raised the illumination level to about 200 lux, but complaints were soon heard of headaches, and of glare and dazzle. The light was said to be "too strong." A new metal fitting with opal plastic louvres was then tried and, despite a further increase in the illumination level (to about 300 lux), which caused the staff no little surprise, the new lighting installation completely satisfied them.

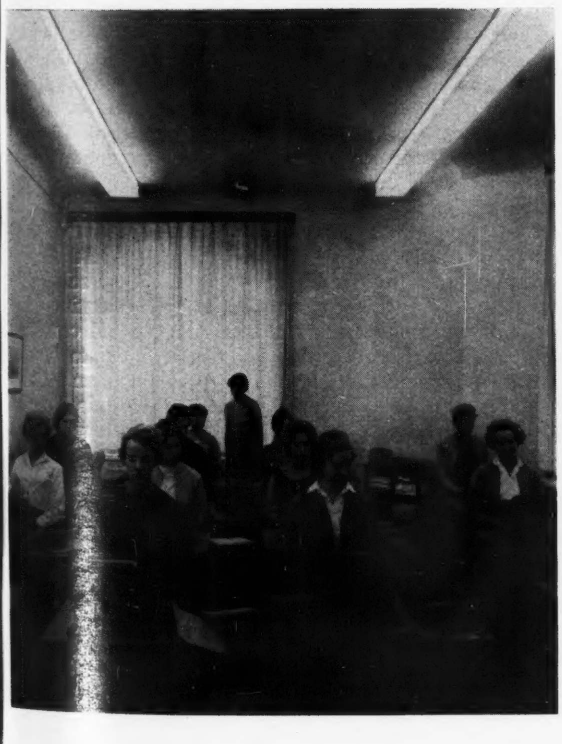
The lighting of the telephone exchange gave much trouble. In 1951 a row of five V-type fittings with glass sides and metal louvres was fixed directly above the heads of the operators. They soon complained: some said that the light was too weak; others that they often had headaches, caused—as they believed—by the winking lamps of the switchboard. The black panel of each switchboard contains very closely spaced jacks, seen by the operator as round brass rings forming a restless pattern; in moving the eye over these brass rings stroboscopic flicker could be perceived. The "colour" of the switchboard (black) is a contributory factor—the contrast between the small lamps and the background being too great.

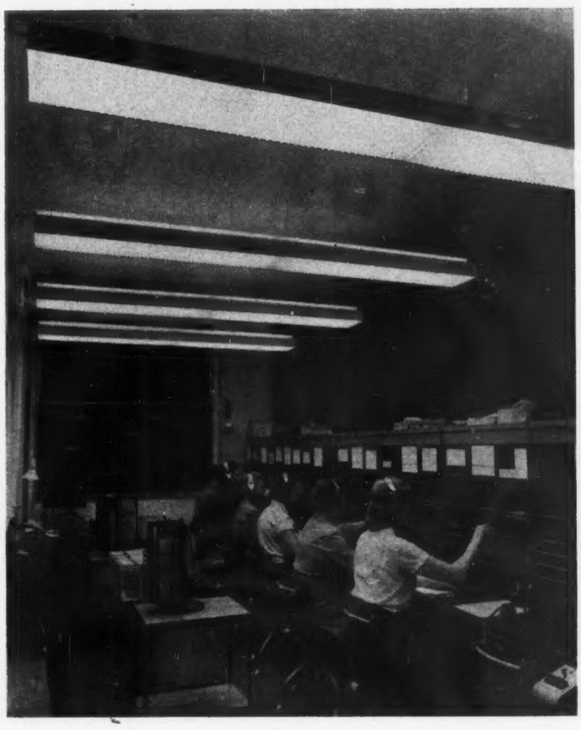
The problem was solved by four continuous rows, each of four fluorescent fittings, the lamps being connected in a lead-lag circuit. The effect closely resembles that given by a luminous ceiling. The illumination level varies between 400 and 500 lux. One of the operators, who states that she is over-sensitive to bright light, has on her own initiative provided herself with an eyeshade.

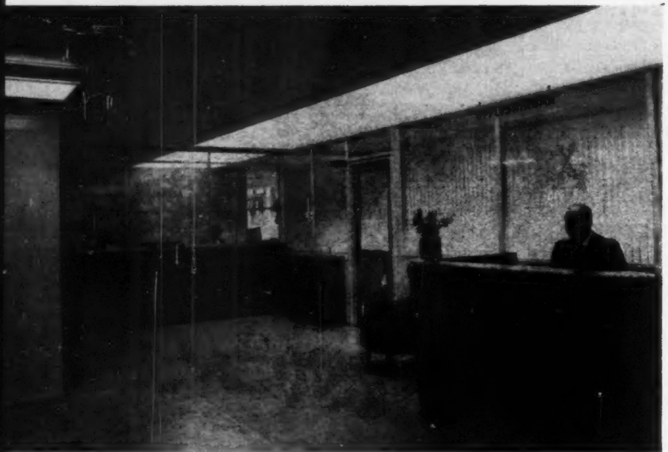
In rooms with less depth fittings with mirror reflectors were used. They were fixed to the ceiling at an angle of about 20 deg., so that the light reaching the working surface came diagonally from behind and from the left.

1	2
3	4

1, office of departmental manager: the ceiling fittings have white-enamelled reflectors and corrugated vinyl covers; supplementary light comes from the fittings cantilevered from the air-conditioning duct in the foreground. 2, punch-card machine room lit by "de-luxe warm-white" fluorescent lamps in fittings arranged at an angle of 20 deg. to the external wall. 3, typing school lit by "luminous beams" with corrugated vinyl covers, giving between 400 and 450 lux at the working plane. 4, telephone exchange: each suspended unit consists of two fittings, each housing two 40-watt fluorescent lamps.







Top: cashier's lobby, lit by ceiling panel of egg-crate plastic louvres concealing rows of 40-watt fluorescent lamps. The illumination level under the panel is over 200 lux. Centre: a conference room (floor area 325 sq. ft.), where a luminous ceiling lit by twenty 40-watt fluorescent lamps provides an illumination level of 600 lux. Bottom: lift lobby, with continuous trough giving indirect lighting reflected from the ceiling and direct lighting through the corrugated vinyl covers.

although the desks were placed at right angles to the outer wall. This arrangement reduced the incidence of reflections. Unfortunately, many office machines still being sold have high-gloss surfaces—notably highly polished keys—and glare from such items can seldom be eliminated completely. Thus, the lighting installation described above created certain difficulties for the staff working with calculating machines. As the left hand is used for calculating, the machine is usually placed directly under the lighting fittings, which give rise to reflections from the keys and from the " window " over the machine register. For this reason, the mirror reflectors were replaced by white-enamelled steel sheet. The radiation of light towards the interior of the room is, thereby, somewhat reduced, but the total loss of light is less than 5 per cent. Moreover, by replacing the louvres by a cover of corrugated vinyl plastic, a high degree of diffusion was obtained, one result of which was to eliminate reflections from the keys.

The glazed partitions also caused disturbing reflections in the large offices, which could be prevented only by grinding the surface of all the glass used within 5 ft. of the ceiling. The conclusion was reached that, under these circumstances, glazed partitions should be avoided.

In large offices every effort was made to achieve the greatest possible uniformity of lighting, as it was not possible to know in advance how the staff would be placed. A possible solution would have been a luminous ceiling of corrugated vinyl sheeting, which would have provided diffuse, but shadowless, lighting. The solution chosen, however, was the " luminous beam "—continuous rows of fluorescent fittings with corrugated vinyl covers, fixed parallel to the external wall and from 6 to 9 ft. apart. The illumination level is between 400 and 500 lux, and is remarkably even, while there is a certain directionality to the light which throws faint and beneficial shadows.

During the course of the modifications to the lighting installation, the colour of the fluorescent lamps has been changed. The final choice was made according to the wishes of the staff and, in spite of the slight extra cost, " de luxe warm-white " lamps are now used. In conclusion, it is worth while mentioning that the interior decoration can play an important part in enabling the lighting to create a warm and cheerful atmosphere. Pale colours are to be preferred; desks should have a matt finish; and floors and ceilings should be light in tone.

Fluorescent Reference Lamps and Reference Ballasts

By D. F. CHAPMAN, A.M.I.E.E.*

This article describes a method of standardising and testing electrical characteristics of fluorescent lamps and control gear.

The performance and operation of tubular fluorescent lamps depend very much upon operating accessories. For example, lamp current and power as well as light output and lamp life depend upon the characteristics of the auxiliary ballast equipment or control gear.

The simple fluorescent lamp circuit shown in Fig. 1 is widely used and has four components:—

(a) lamp,
(b) choke or reactor,
(c) starter switch,
(d) power-factor correction capacitor.

In this circuit the lamp is started by the starter switch and the electrical characteristics of the choke then determine lamp operating current, voltage and power. (The power-factor correction capacitor is used to reduce "wattless" current drawn from the supply and plays no part in lamp operation.) If choke impedance is too high the lamp will be under-run and will not deliver full light output. Conversely, if choke impedance is too low, lamp current and power will be too high and the lamp will be over-run. It is therefore necessary to co-ordinate design of lamps and control gear and to manufacture each component to close electrical tolerances so that satisfactory performance of the whole circuit is obtained.

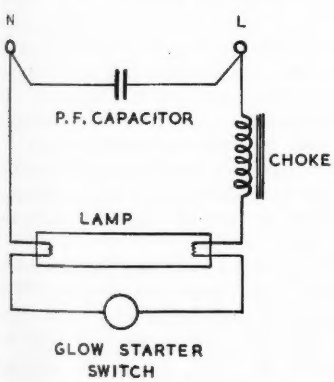


Fig. 1. Simple fluorescent lamp circuit showing connection of components.

Before we can ensure satisfactory circuit performance and satisfactory operation of fluorescent lighting fittings it is necessary to have standard or reference values against which manufacturer and user can test and compare electrical characteristics of lamps and control gear. It is also necessary to have a standard test procedure with specified test conditions so that measurements can be reproduced and so that variable external factors which affect lamp and ballast performance are controlled or compensated as far as possible.

Fluorescent lamps are manufactured in various sizes and wattages. Dimensions and electrical ratings of the most popular types have already been standardised.[1, 2] All control gear should operate lamps within a few per cent. of these published ratings to ensure optimum lamp performance.

Reference Lamps

If we measure a batch of similar-size fluorescent lamps we find that their electrical characteristics vary slightly from lamp to lamp. It is therefore first necessary to select lamps with certain suitable electrical values and, subsequently, to use these lamps for testing control gear and circuit performance. Such lamps are known as Reference Lamps. They are aged for at least 100 hours before use to stabilise their electrical characteristics as far as possible. The same cap contact or pin is always connected to the same part of the test circuit when they are used so that differences due to cathode behaviour are minimised.

Reference Ballasts

As already noted, the current, voltage and power delivered to a fluorescent lamp depends very much upon the electrical characteristics of the choke or ballast. Before Reference Lamps can be selected it is necessary to specify the electrical characteristics of the Reference Ballast which will be used in the test circuit.

For purposes of lamp operation and measurement a choke can be specified by three main parameters or values. These are :—

(a) Impedance (ratio of sinusoidal choke voltage/current);
(b) Power factor (ratio of choke watts loss/voltamps);
(c) Distortion of current wave due to harmonics (measured by linearity of impedance over a range of currents).

Such values for a range of different Reference Ballasts have been determined by lamp manufacturers, and details are available in a number of Standard Specifications ([3, 4, 5, 6]).

The three electrical values used to specify a Reference Ballast must be kept within close tolerances, and it is usual to make check measurements each time before the ballast is used. Reference Ballasts must be soundly constructed and designed to run cool and to give the required electrical characteristics with provision, if possible, for slight adjustment. Internal construction of a typical Reference Ballast is shown in Fig. 2.

It should be noted that a lamp is not used during measurement of the characteristics of the Reference Ballast.

* Thorn Electrical Industries Ltd.

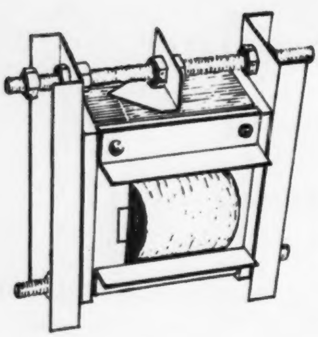


Fig 2. Internal construction of a reference ballast. Impedance can be adjusted by the variable magnetic shunt.

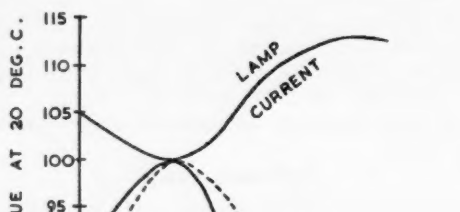


Fig. 3. Effect of temperature upon electrical characteristics of 4 ft. 40-watt fluorescent lamp operated with fixed series choke impedance.

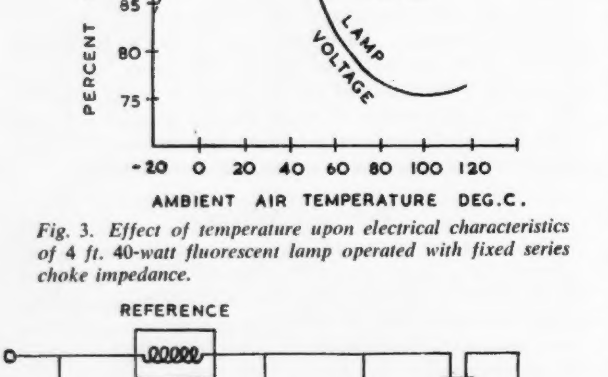


Fig. 4. Recommended circuit for measuring reference lamps.

Measurement of Reference Lamps and Ballasts

A Reference Ballast is used to select and test Reference Lamps which are subsequently used for testing manufactured chokes and ballasts.

Both these tests involve measurement of the electrical characteristics of the Reference Lamp. It is perhaps not well known that accurate and reliable measurement of lamp values is by no means easy. Lamp characteristics are affected by a number of external factors, the most important of which is temperature[7, 8].

As shown in Fig. 3 a change in surrounding ambient air temperature will cause a large change in electrical characteristics. It is therefore necessary to control the temperature round the lamp during measurement. At the present time the actual temperature value has not been fully standardised; it is likely however that 25 deg. C. will be adopted.

The measurement of Reference Lamp characteristics requires care in the choice and use of electrical indicating instruments. Briefly, the instruments should not disturb conditions in the lamp circuit more than necessary and they should read RMS values of the distorted waveforms. A typical circuit for selecting and checking Reference Lamps is shown in Fig. 4. With this circuit it is not necessary to compensate the wattmeter reading for power absorbed by the pressure coil provided certain precautions are taken[6].

Suitable Reference Lamps must have a voltage, current and power consumption within 2.5 per cent. of the specified reference values and it is usual to make a check before and after each series of tests when the lamp is used to measure manufactured chokes and ballasts.

Use of Reference Lamps and Ballasts

The purpose of selecting Reference Lamps by measurement in conjunction with a Reference Ballast is to obtain a reproducible "standard" lamp which can then, in turn, be used to test and compare manufactured chokes and ballasts. Details of tests and measurements to which manufactured ballasts should conform are available in various specifications[3, 5, 6].

The aim is to ensure that all equipment gives fair treatment to the fluorescent lamp without excessive over- or under-running and without in any way sacrificing lamp performance or life.

It is not necessary to test every item of control gear from the factory with a Reference Lamp. Such a test would take too long and would hardly be suitable as a routine test on the factory floor since very sensitive instruments are required. Instead, the Reference Lamp can be used to find suitable "routine comparison ballasts" of the same type as manufactured. Electrical characteristics of these ballasts can then be measured separately without the lamp, and the values obtained can, with suitable tolerances, be used by the manufacturer to test choke and ballast production. This is one of the test methods adopted in the new BS 2818/1957.

It is seen that the Reference Lamp and Ballast forms the basis of all lamp and control gear measurement. This in turn enables the electrical performance of fluorescent lighting fittings to be specified and tested and helps to ensure that the user gets the most out of his lighting installation.

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The Physical Society Exhibition

A report on the exhibits at the forty-first exhibition of the Physical Society held in London from 25th to 28th March, 1957.

The Annual Exhibition of Scientific Instruments and Apparatus organised by the Physical Society was again held this year in the two halls of the Royal Horticultural Society and was as well attended as ever. There were a number of exhibits of direct interest to the lighting engineer, among them several novelties in the range of lamps available for purposes other than ordinary lighting, a few special-purpose photometers, colorimeters, densitometers and photocells.

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New lamps

Philips Electrical Ltd. showed a 250-watt compact source u.v. lamp in which the mercury was vaporised in argon, with no forced cooling, the distance between the electrodes being less than 4 mm. The discharge tube was of quartz and the envelope of a special hard glass transparent to ultra-violet. Another lamp intended for use as a source of u.v. radiation was a 125-watt lamp with an arc length of 30 mm. and no outer envelope. The light output was stated to be 4,500 lumens.

Yet another lamp shown on the same stand was a 4-watt lamp intended for the continuous production of small quantities of ozone. A single coiled filament of inverted vee form, mounted in a bulb containing mercury vapour, was heated until a discharge was started between its two ends. The bulb was made of special glass transparent to the 1850 Å radiation in the short-wave u.v. There was also a source of long-wave u.v., viz. around 3,500 Å. This was a 4-ft. 40-watt fluorescent lamp with special phosphors giving radiation in this region. The lamp was covered with a cobalt glass sheath which removed practically all the visible light.

Finally there was a xenon flash discharge tube mounted in a bulb with internally mirrored surface, giving a forward intensification factor of 6.3.

The Research Laboratories of the British Thomson-Houston Company showed a novel form of tubular fluorescent lamp with an inner tube at one side to provide cold spots for the condensation of excess mercury, so that the lamp could be operated efficiently at higher ambient temperatures than hitherto. Another BTH exhibit was a xenon flash tube in which the flash duration could be prolonged by controlling the rate of discharge of energy, the light output remaining substantially constant for about two-thirds of the duration of the flash.

Dawe Instruments Ltd. demonstrated a high intensity point-source lamp giving intermittent light at frequencies up to 10,000 flashes per minute and intended for use in a projector system to give stroboscopic illumination of objects at a distance. The object chosen for the demonstration was the filament of a tungsten lamp subjected to mechanical vibration at 50 cycles per second, and it was interesting to watch the oscillatory movements of the filament in its supports.

Photometers and colorimeters

Examples of what might be described as " orthodox " photometers were shown by Megatron Ltd. Their improved street-lighting photometer and other cosine-corrected light meters were accompanied by a colour-temperature meter and by a number of photovoltaic cells of different shapes and sizes. An interesting novelty was the " potted " cell sealed in an airtight envelope to ensure protection against chemical fumes and the like.

Two Government research laboratories showed photometers with special applications. On the stand of the Chemical Defence Experimental Establishment there was an integrating flashmeter for measuring the time integral of the illumination received from a distant light flash. The current from a photocell behind a diffusing glass window was fed into a capacitor and special arrangements were made to neutralise the dark current from the cell and the effect of the night sky illumination. On its most sensitive range the instrument gave full-scale deflection for an exposure (illumination x time) of 0.5 millilumen-second per square foot.

The Road Research Laboratory showed a photometer used for measuring the performance of retro-reflectors used on vehicles and on road signs. The reflector was illuminated and observed through a collimating lens, so that a range of only 6 feet was required between the light source and the reflector and between the reflector and the measuring photocell. The light was interrupted at 400 cycles per second and the cell used was a colour-corrected multiplier photocell with selective amplifier. The reflected light could be measured at any angle up to 3 degrees from the normal.

A very interesting exhibit was that of marine biological apparatus shown by H. Tinsley and Company, Ltd. Some 12 years ago Dr. W. R. G. Atkins described to members of the IES his work at Plymouth on the transmission of sea water and its light scattering properties. The apparatus shown consisted, in essence, of two photocell photometers, one placed on the deck of a vessel and the other lowered into the sea to any desired depth. In use, readings are taken at every 10 metres down to about 100 metres and then the results are plotted to determine the mean extinction coefficient.

The scattering meter consisted of a head containing (a) a lamp with collimator giving a beam directed downwards and (b) a group of eight photocells surrounding the lamp and having their sensitive surfaces downwards so that the only light reaching them was that scattered upwards by the particles suspended in the water illuminated by the beam of light.

The colorimeter shown by Joyce, Loebl and Company, Ltd., was a four-beam differential instrument designed for the precise measurement of colours in terms of the CIE co-ordinates. Two beams were used for the conventional comparison of the sample with the standard, their difference being then compared with a magnesium oxide surface by means of two other beams having a known difference. The sensitivity was claimed to equal or surpass that of the eye.

The number of exhibits on the stand of Tintometer Ltd. was not great but every item was a novelty. The most striking was a portable hand tintometer, with a pistol grip, which made it easy to measure such colours as the erythema of the skin produced by exposure to radiation, or the reduction in colour caused by treatment of birthmarks. It was tempting to speculate on the many other day-to-day

problems in practical colour measurement that might be solved by an ingenious application of the use of the tintometer principle.

Densitometers

As in previous years, several exhibitors showed quite elaborate instruments for the measurement of optical density. In particular, Joyce, Loebl and Company, Ltd., had on their stand the latest model of their double beam automatic recording microdensitometer for measuring the density of films or plates. An interesting feature was the servo system which controlled the speed of travel of the plate so that it was proportional to the slope of the density curve. The range of optical magnification was extended in this instrument and was from x2 to x200.

The Baldwin Instrument Company, Ltd., showed a number of different types of densitometers. First there was a general-purpose transmission densitometer for making measurements on all kinds of materials in addition to exposed film. Next came a "line densitometer," similar in principle but designed for measuring the density of sound tracks on 35 mm. film. Then there was a reflection densitometer, for measuring the reflection factors of materials of all kinds, and finally a comparator with which the density of a test specimen could be compared with that of a standard to a high degree of accuracy.

An instrument which could not be called a densitometer, although its function was to measure density, was the portable "smokemeter" shown by the Food Investigation section of DSIR. It consisted of a photovoltaic cell mounted at a fixed distance from a source of light. The smoke to be measured passed between the two and the reduction in the illumination of the cell furnished a measure of the smoke density. The basic principle was not novel, but it was interesting to learn that one of the troubles to which such an instrument has always been subject, viz. condensation on the glass windows protecting the cell and the light source, was overcome by using windows which had a conducting layer and could therefore be heated electrically.

Photocells

It will have been noticed that in at least one of the instruments referred to earlier a multiplier photocell was used. EMI Electronics, Ltd. showed a most impressive collection of these very intricate and extremely sensitive detectors of radiation.

A comparative newcomer to the ranks of photosensitive devices is the photoconductive cell. The Research Laboratories of the General Electric Company, Ltd. showed two types of cadmium sulphide photoconductive cells, one a miniature single-crystal cell and the other a large area powder-layer cell. By the use of suitable activation techniques the wave-length of maximum response can be varied and of the two single-crystal cells shown one had its peak at 5150 Å and the other at 7000 Å. The maximum response of the powder-layer cell shown was in the latter region and it was stated that it would pass a current of 10 milliamps under an illumination of 1 lumen per square foot. Such a cell could be used for the direct operation of a relay by light falling on the cell.

Other devices

The BTH Research Laboratories had an exhibit showing the electroluminescence (luminescence excited by an alternating electric field) of single crystals of zinc sulphide activated by suitable amounts of copper and chlorine. A clock with an electroluminescent dial was also to be seen.

For measuring the fluorescence of a material dyed with an optical bleach, an improved model of the "EEL" fluorescent light meter exhibited last year was shown by Evans Electroselenium Ltd.

Finally, Chance Brothers, Ltd. showed a new glass (OY 20) designed to lower the apparent colour temperature of a source giving full radiation, the decrease being about 55 mireds per mm. thickness. This glass is complementary to the familiar OB 8 blue glass which has long been widely used to raise the apparent colour temperature of a light.

Situations

Vacant

Frontispiece

The picture on page 176 shows the main gallery of the new Department of Fine Art in the recently opened Portland Building at Nottingham University. General lighting is provided from an "egg-crate" ceiling with 2-in.-sq. louvres suspended below a high north-light ceiling. Pearl-type tungsten lamps are used. Lighting of the pictures is by a special fitting designed by the GEC Ltd. and housing 5-ft. new warm white fluorescent lamps.

March Issue

It has come to our notice that a few readers may not have received their copies of our March issue. We should be pleased to dispatch a further copy to any such reader on application and would apologise for the inconvenience caused, which was due to circumstances beyond our control.

Erratum

In the article by Dr. Walsh on Sector Flux in the May issue Figs. 2 and 4 should be interchanged. We apologise to the author and to readers for this error.

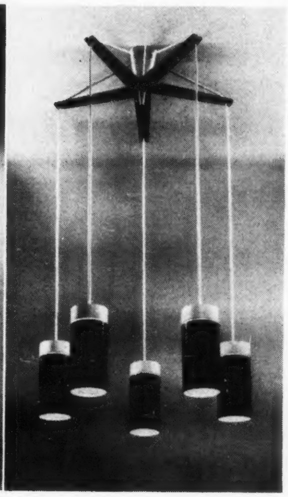
NEW PRODUCTS

Bulkhead fitting

Wardle Engineering Co. Ltd. have added a new lighting unit, the "prismalette," to their range of directional bulkhead units. Made of cast-iron, it has a skirted porcelain lampholder for lamps up to 100 watts; the front glass is prismatic. A choice of five inlets is available. The list price is 26s.

Tungsten lamp fittings

Troughton and Young (Lighting) Ltd. have recently introduced a new range of tungsten lamp fittings, single and multi-cluster pendant, wall, desk and ceiling mounted, inspired by the Harlequin costume and therefore called the "Harlequin" range. Basically in black and white, they are also available in blue, two shades of green, lemon and grey. Illustrated are two of the fittings, but the number of variations is enormous and the catalogue alone shows over 500.



Radio frequency lamp

Sylvania Electric Products Inc. have introduced a new model of their RF (Radio Frequency) lamp. The RF lamp converts radio signals into a concentrated uniform light source in the form of a small disc of refractory material, the radio energy being carried to the lamp by means of a copper coil wound around the outside of the lamp from a radio frequency oscillator. A DC supply is used and the brightness of the lamp can be controlled by varying the voltage. The lamp and coil are water cooled. In the original model the refractory disc was 5-16 in. in diameter. In the new model the disc has been increased to ½-in. diameter, thereby bringing it into line with the international light source and eliminating the need for a new lens system to give additional magnification. The new lamp also operates at 3,100 deg. K. compared with 3,500 deg. K. in the original model, thus allowing use with present type colour filters and extending the life of the lamp, which is now 500 hours compared with 100 hours for the original model and 10-25 hours for the standard projection lamp.

Tungsten lamp fittings

Cone Fittings Ltd. have introduced a new range of their pendant and wall fittings similar to their "P" type range in construction, but using new shades made of silk-screen printed card with black metal work. Basic prices range from £1 14s. 9d. for a wall light to £7 18s. 1d. for a pendant fitting.

Fitting for tunnel and underpass lighting

A new fluorescent luminaire designed for tunnel and underpass lighting is announced by the General Electric Company, Schenectady. Named Form 106U, the six-foot, single-lamp unit is designed to produce adequate lateral illumination for sidewalls and ceilings as well as to effectively direct the desired amount of light on the roadway.

It has a one-piece extruded acrylic plastic globe that has been scalloped to provide the proper diffusion of light. Both the globe and the alzak aluminium reflector are side-hinged for easy access to lamps, ballasts, and wiring. Spring-loaded sockets provide easy relamping when necessary. An extruded aluminium hood and die-cast aluminium end plates provide for reduced maintenance and easier handling. It is equipped with adjustable-angle galvanised steel mounting brackets and resilient gasketing material between the hood and globe.

Mercury lamps

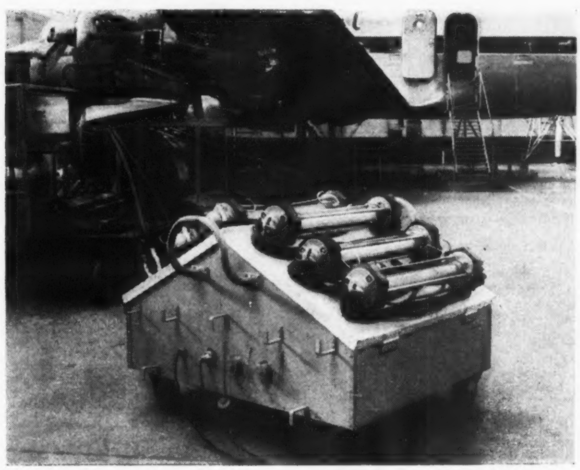
The International General Electric Company has introduced two new white mercury lamps which it is claimed give as much as 63 per cent. more light than older-type lamps, and a better colour rendering.

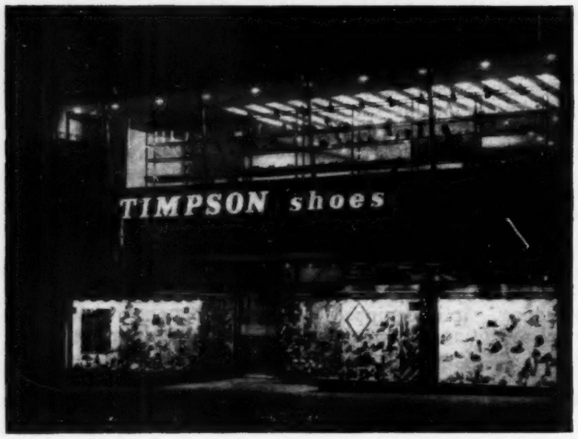
The improved performance of the white mercury lamp is the result of a new strontium magnesium orthosphosphate phosphor which converts ultra-violet radiation into white light more efficiently than other phosphors.

The new lamps are H400-RW1 (23,000 lumens), a reflector lamp which not only directs two-thirds of the light to the work surface but also seals the reflector against dirt and fumes, and the H400-EW1 (22,000 lumens) in the familiar and popular bulged tubular shape. The economic life of both lamps is 6,000 hours.

Flameproof fluorescent fitting

A new specially designed Mazda 2 ft. 40-watt flameproof fluorescent fitting has recently been introduced by the AEI Lamp and Lighting Co., Ltd., for use in aircraft maintenance shops. Fluorescent lighting with its low brightness and cool operation is particularly suitable for work in confined spaces, such as inside fuel tanks where glare and heat can make working conditions particularly uncomfortable. The fitting consists essentially of two cast aluminium end boxes housing lamp-holders and a starting switch, connected by three aluminium alloy spacing tubes. Hooks are provided to hang the fitting, together with an adjustable reflector which slips on to the glass cylinder protecting the lamp. Six fittings are carried on a trolley consisting of a flameproof box on wheels housing control gear and with flameproof switches and plug sockets for the fittings. Oil-resisting rubber cable is used.





Architect, J. G. L. Poulson, L.R.I.B.A., in collaboration with B. G. Nicholass, L.R.I.B.A.; interior design consultants, THM Partners; lighting consultants, AEI Lamp and Lighting Co., Ltd.; shopfitting, John Curtis and Sons, electrical installation, Shaw Dale; lighting fittings, Courtney, Pope (Electrical), Ltd., Frederick Thomas and Co., Philips Electrical, Ltd., Troughton and Young, Ltd., Herbert Terry and Sons, Ltd.; illuminated sign, Claude-General Neon Lights, Ltd.

Shoe Store in Leeds

WILLIAM TIMPSON, LTD., owners of nearly 250 retail shoe stores, opened recently this new branch in Briggate, Leeds. It has three floors—basement, ground floor and first floor, accommodating respectively the children's, men's and ladies' departments. Part of the basement serves also the shoe-repair service, while part of the ground floor, which has a total floor area of 1,750 sq. ft., acts as circulation space.

Virtually the whole of the front elevation is glazed, except for a horizontal panel of black "Pierrite" to which the illuminated letters of the name sign are fixed. This large window area allows the public to see right into the store. The forecourt is of terrazzo; the window frames and blind box are of stainless steel and the entrance doors of armour plate glass.

Throughout the store, the walls are lined with shelving for stock—an approach in direct contrast to the current trend in the design of shoe stores. It is said by the designers, however, that this arrangement saves the labour of the sales assistants and is preferred by the customers. Floors on each floor are carpeted, except for part of the basement floor which is of 12 in. sq. ash blocks.

Included on the first floor, at the front of the building, is the store-manager's office, separated from the sales area by an ash screen—this material being used for all the fitments on this floor, including the display unit which stands adjacent to the window and can be seen from the street. A feature of the children's department is a colourful mural based on the game of "snakes and ladders."

Lighting

The lighting scheme was designed by THM Partners, in collaboration with the A.E.I. Lamp and Lighting Co., Ltd. The windows are lit by 24 4-ft. 40-watt fluorescent lamps concealed by a false ceiling of eggcrate louvres. In the foreground, 27 "eyeball" fittings containing 150-watt reflector spot lamps add sparkle to the display.

On the ground floor, lighting is mainly from 17 "portholes" in the suspended ceiling with opal-glass covers. Above each of these fittings are three 2-ft. 40-watt fluorescent lamps. Extra light comes from 42 150-watt reflector spot lamps (mostly near the entrance) and from 32 75-watt g.s. lamps in fittings recessed into the suspended ceiling.

In the ladies' department (first floor), lighting in the main sales area is from a slotted ceiling: two 80-watt fluorescent lamps are concealed on either side of alternate "slots" (an arrangement dictated by the structural components above) and reflected light from the soffit of the main ceiling gives strong, but diffuse, lighting to this area. Elsewhere on the first floor, light comes from 45 downlights, each containing a 150-watt g.s. lamp, recessed into the ceiling, giving an illumination level of between 40 and 50 lm/ft^2. Display fitments are lit by conical and diabolo-shaped spotlights.

The children's department has been given a totally different treatment. Partly recessed into the ceiling are 32 opal-glass fittings of Swedish design, each containing a 100-watt g.s. lamp, while the mural mentioned above is lit by a row of three swivel-mounted spotlights each containing a 75-watt reflector lamp. As in other departments, the wrapping counters are given extra light by fluorescent lamps concealed behind a pelmet pierced by lettering, while the repairs counters are lit by rows of circular fittings recessed into the canopies above.

Display units throughout the store are illuminated by 2-ft. fluorescent lamps built into the units and by various types of spotlight both within and around them.

Top, a night view of the exterior of the store, showing how the display unit on the first floor, lit by a row of conical-shaped spotlights, is clearly seen from the street. Opposite page (top), the ladies' department with its slotted ceiling lit by concealed fluorescent lamps; (bottom), the children's department, which is lit by opal-glass fittings partially recessed into the suspended ceiling. In the foreground is the repairs counter.

Lighting Abstracts

OPTICS AND PHOTOMETRY

440. Phantom indication in light signals. 628.975
K. GROSSKURTH, *Lichttechnik*, **9**, 62-65 (Feb., 1957). *In German.*

The true phantom is that produced when light from an external source, particularly the sun, is brought to a focus at or near the position of the light source in the signal so that the signal appears to be alight. Phantoms may also be produced by reflection in the mirror of the signal or at the front glass. Each of these three effects is treated separately and the remedies suggested are examined in turn. Reflection at the mirror may be almost eliminated by the use of an annular catadioptric element in the lens. Reflection from the front glass may best be avoided by tilting the glass backward and providing a hood over the signal. The true phantom can be avoided altogether by the use of an automatic shutter near the lamp. It can be greatly reduced by the use of a hood. The problem of the small repeat signal, which is below the level of the observer's eyes, is considered separately.
J. W. T. W.

LAMPS AND FITTINGS

621.327.9
441. On the light-mechanism of electroluminescence.
G. GUNTHER, *Ljuskultur*, **29**, 24-27 (*Jan.-Mar.*, 1957). *In Swedish.*

The basic mechanism of the phenomenon of electroluminescence is described, in terms of internal ionisation and acceleration of electrons in the solid dielectric.
R. G. H.

621.327.534.15
442. The new fluorescent lamp colour " Soft-white de luxe."
G. GUNTHER *and* G. SILJEHOLM, *Ljuskultur*, **29**, 21-22 (*Jan.-Mar.*, 1957). *In Swedish.*

The Swedish lamp " mjukvit lyx " has a mixture of " conventional silicate and tungstate with magnesium germanate " as the fluorescent coating. The C.I.E. coordinates are given as $x = 0.440$, $y = 0.375$, $z = 0.185$, and the relative energy emission in the eight C.I.E. spectral bands, from 1 to 8 as 0.008, 0.29, 0.24, 3.63, 34.2, 44.6, 16.2, and 0.83 respectively. The efficiency is lower than the standard type of lamp, the 40-watt lamp giving 1,600 lumens, but with the better rendering of flesh colours, less illumination will give the desired result, with consequently less chance of fading of photosensitive materials.
R. G. H.

621.326
443. A uniform light source excited by radio frequency.
S. C. PEEK, *Illum. Engng.*, **52**, 96-102 (*Feb.*, 1957).

To meet the need for a small, bright light source for uses involving a narrow pencil of light rays, a new lamp has been developed comprising a 5/16 inch diameter tantalum carbide disc heated to incandescence by radio-frequency induction. The source, which has a colour temperature of 3,700 deg. K, has applications in cinematograph film printers, 16 mm projectors, infra-red spectroscopy and colour television tube processing. Various operating characteristics of the lamp are given.
P. P.

621.327.534.15:535.6
444. Colour and colour rendering of tubular fluorescent lamps.
A. A. KRUITHOF *and* J. L. OUWELTJES, *Philips Techn. Rev.*, **18**, 249-260 (*Feb.*, 1957).

The principal problems met with in producing a fluorescent lamp which will give good colour rendering are (a) deficiency in the red and (b) the occurrence of two humps in the spectrum, one due to the mercury line at 435.8 mμ and the other deliberately introduced by means of the phosphors to balance this line as far as the overall colour of the light is concerned. Various remedies have been tried. Defect (a) can be reduced by introducing a magnesium arsenate phosphor and modifying the components of the other phosphors. Defect (b) can only be dealt with by absorbing the unwanted mercury radiation. It has been found possible to do this by adding a layer of a specially prepared magnesium arsenate to the ordinary phosphor layer. The mode of preparation is not described. The final section of the paper describes the properties of the three lamps developed in the way mentioned. These have pseudo-colour temperatures of 3,000, 4,200 and 6,500 deg. K and the respective relative radiations in the eight spectral bands show a good approximation to the distributions of a full radiator at these temperatures.
J. W. T. W.

628.971.6
445. Comparison of the high-pressure mercury fluorescent lamp and the low-pressure fluorescent lamp for street lighting.
K.-H. BODENHAUSEN, *Lichttechnik*, **9**, 66-67 (*Feb.*, 1957). *In German.*

The author considers that the advantages of the high-pressure (colour corrected) lamp have not received sufficient consideration in an article by A. Winde [*Lichttechnik*, **8**, 439-440, *Oct.*, 1956]. He compares the two types of lamps from the points of view of initial cost, efficiency, maintenance and cleaning, life, reduction of light at low temperatures, glare and, finally, sensitivity to fluctuations of the supply voltage. He concludes that the h.p. lamp is the better in a number of ways when the conditions of use are taken into consideration. In his reply A. Winde deals with the author's arguments one by one.
J. W. T. W.

446. History of lighting by fluorescence. 621.327.534.15
J. RISLER, *Bull. Soc. Franç. Elect.*, 7th Series, VI, 753-765 (*Dec.*, 1956). *In French.*

The author recounts the earlier researches on the association of fluorescent materials and electric discharge for the production of light. He claims to have patented and demonstrated and produced fluorescent tubes, using as phosphors zinc-cadmium sulphide with copper activation, between 1921 and 1928, some 10 years before their commercial development. Many such tubes were used as signs in Paris in 1925; they were demonstrated to the Société Française des Electriciens in 1923.
J. M. W.

LIGHTING

628.9
447. The lighting of standard factories on a trading estate.
J. S. MCCULLOCH, *Trans. Illum. Eng. Soc.* (*London*), **22**, 49-61 (No. 2, 1957).

Describes the development of a standard lighting installation for use in standard factories on industrial estates in the North Eastern Development Area. The annual cost of such installations, using different light sources, is compared, and some comments are made on the types of fittings used by the tenants.
W. R.

628.972

448. Luminous ceilings of corrugated plastic, their erection and maintenance.

C. Lundberg, *Ljuskultur*, **29**, 15-17 (*Jan.-Mar.*, 1957). *In Swedish.*

Corrugated plastic luminous ceilings can be erected very quickly, and their maintenance is not too difficult. Dust should be removed by vacuum cleaner to a regular schedule, or alternatively the plastic sections should be removed and washed with a soft brush. Lamps should be replaced with the "spring-clean." The advantage of the luminous ceiling is that an occasional early lamp failure passes unnoticed because of the diffusing characteristics of the plastic material. R. G. H.

449. Light in hospitals. 628.97

C. B. Holmberg, *Ljuskultur*, **29**, 9-14 (*Jan.-Mar.*, 1957). *In Swedish.*

At the moment there are no official standards for the artificial lighting of hospitals in Sweden, each architect or designer doing as he pleases. Several large hospitals were visited and persons interviewed, photographs taken, and measurements of illumination made. The main requirements for ward lighting are a comfortable, glare-free, gentle light which gives a pleasant character to the ward, together with the provision of a much higher level for certain short periods, such as doctors' inspections. The bedside lamps are a difficult problem, and while examples of good lamps can be found, there is no unique solution and certainly no one lamp which meets the requirements. These requirements are detailed and compromises suggested. Night lights should be placed low and should be invisible to the patients. The report of the Finnish secretariat for the hospital lighting section of the C.I.E. is recommended as a basis for regulations. R. G. H.

628.93

450. The effect of furniture on the coefficient of utilisation.

D. E. Spencer, *Illum. Engng.*, **52**, 35-39 (*Jan.*, 1957).

A method for calculating the coefficient of utilisation of a room is proposed where the ceiling of the room is obstructed by beams or there is furniture present in the room. The method involves determining the equivalent reflectance of an imaginary ceiling or floor drawn through the bottoms of the beams or the top of the furniture. An equation for the equivalent reflectance is given and the method is demonstrated by applications to a luminous ceiling and to a furnished office. P. P.

451. Interreflections in a room with luminous walls. 628.93

H. S. Bull, *Illum. Engng.*, **52**, 28-32 (Jan., 1957).

The accuracy of Moon and Spencer's interreflection equations for luminance : illumination ratios in rooms of varying proportions has been checked by means of measurements in a model room having four luminous walls. In most cases the computed ratios were in excess of the measured ratios. The discrepancies are thought to arise from errors in specifying the reflection characteristics of the room surfaces and from errors in the equations and in their application to the particular model room conditions. P. P.

452. Lighting developments in Czechoslovakia. 628.9

Jiri Havelka, *Trans. Illum. Eng. Soc.* (*London*), **22**, 35-44 (*No.* 2, 1957).

Gives an account of research work carried out in Czechoslovakia in the last 10 years. The problem of the economical rated voltage of incandescent lamps is analysed in general and the economical voltage derived for cases of varying mains voltage and cost of electrical energy. The attainable economy is critically evaluated. The second part of the paper deals with the economical interval for maintenance and re-lamping and the method of its computation. Special attention has been paid to the investigation of the most favourable arrangement of fluorescent lamps for factory lighting and an attempt made to express the quality of illumination by a single "quality index" to enable a clear comparison of the individual arrangements. W. R.

453. The calculation of street lighting. 628.93

L. Starby, *Ljuskultur*, **29**, 5-7 (*Jan.-Mar.*, 1957). *In Swedish.*

The simple basic formulae for the calculation of illumination in lighted streets are described. The formula given for the luminance distribution assumes diffuse reflection characteristics for the surface. It is pointed out that this assumption is incorrect for wet surfaces. R. G. H.

628.971

454. Lighting outdoor locations of central station properties.

Illum. Engng., **52**, 105-118 (*Feb.*, 1957).

Prepared by the American IES Sub-Committee on Lighting of Outdoor Locations, this Recommended Practice reviews the basic principles of seeing tasks and then deals with general and specific applications of outdoor artificial lighting to public utility (electricity and gas) installations. The different types of outdoor luminaire which can be used are considered and their characteristics tabulated. Recommended levels of illumination for such locations as catwalks, coal and oil storage, parking areas, roadways and entrances, etc., are also listed. P. P.

628.92

455. Daylighting design with adjustable horizontal louvers.

J. W. Griffith, E. W. Conover *and* W. J. Arner, *Illum. Engng.*, **52**, 57-62 (*Feb.*, 1957).

Measurements have been made under natural outdoor conditions and in the laboratory of the daylight illumination in a model-scale room with a single side window having horizontal louvers of adjustable angle. These measurements were correlated with the relative position of the sun and the illumination received on the outside of the fenestration. Coefficients of utilisation were derived from the measurements and are given in six tables. A worked example shows how these coefficients can be used to calculate the daylighting levels in a room with louvered windows. P. P.

628.92

456. Measurements in daylighted classrooms in Arizona.

J. R. Williams, *Illum. Engng.*, **52**, 67-73 (*Feb.*, 1957).

Extensive photometric measurements have been made in four schools in central Arizona to ascertain the levels of daylight illumination and luminance obtainable in buildings of post-war design in a climate where sunshine is 85 per cent. of the maximum possible. In each case large overhangs were provided above the side windows and clerestories. Although the illumination levels were generally above the American IES recommended minimum (30 lm/ft^2), the luminance ratios were mostly excessive and some form of blinds or louvers should be provided to improve the quality of the daylighting. P. P.

457. Availability of daylight. 628.92

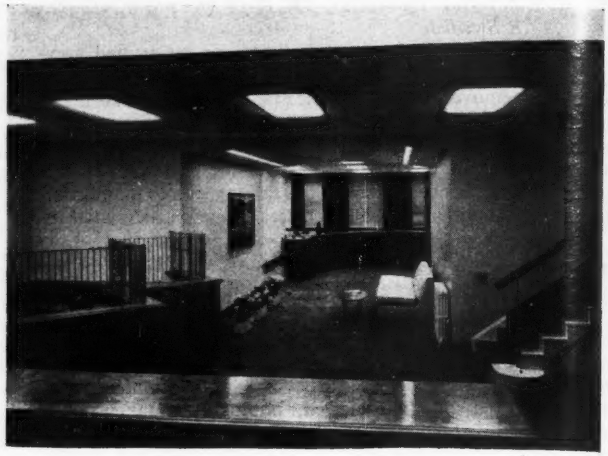
H. F. Kingsbury, H. H. Anderson *and* V. U. Bizzaro, *Illum. Engng.*, **52**, 77-83 (*Feb.*, 1957).

Measurements at Port Allegany, Pennsylvania, of the daylight illumination on vertical planes facing the four cardinal points, and on the horizontal plane, are reported for the years 1953 and 1954. For other parts of the United States a conversion from solar radiation data to illumination data can be employed, using a relationship derived from simultaneous radiation and illumination measurements made by the United States Weather Bureau. An empirical conversion has been derived from the Port Allegany data enabling the number of hours per day for which a given illumination level is exceeded to be calculated from the total daily illumination (in foot-candle-hours). P. P.

LIGHTING INSTALLATIONS

Canadian Bank of Commerce, London, W.1

"Module" fittings (4 ft. × 2 ft.) with dished opal "Perspex" diffusers have been installed in an acoustic plaster ceiling. Each fitting houses four 4-ft. 40-watt fluorescent lamps. The average illumination is approximately 30 lm/ft^2. (Architects, Gunton and Gunton, F/FRIBA; lighting equipment, AEI Lamp and Lighting Co. Ltd.)

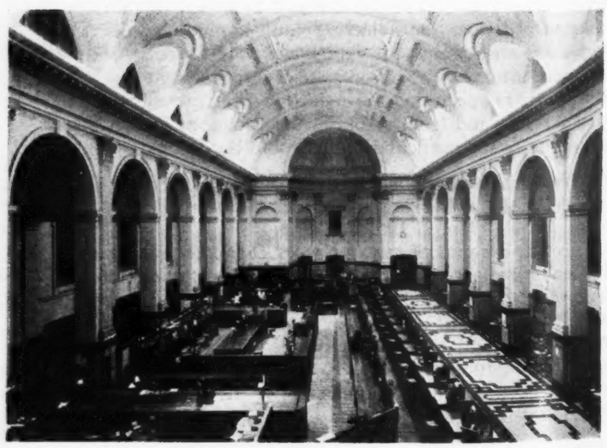


Lloyds Bank, Portsmouth

The main area of this bank is lit by troughs housing hot cathode fluorescent lamps above the glass ceiling. The troughs are fixed to the ceiling girders as seen in the small photograph below. (Architects, Sir John Burnett, Tait and Partners; lighting equipment, SLR Electric Ltd.; installation by Trollope and Colls Ltd.)

Barclays Bank, Norwich

This banking hall is 150 ft. long and 53 ft. high. In designing the new lighting it was wished to retain the character of the building. Three rows of 5-ft. fluorescent lamps in a special reflector are fitted to the 2-ft.-wide cornice which runs along each side of the hall at a height of 35 ft. above the floor. The lamps are screened from view by a "Perspex" diffuser. (Consulting engineer, G. T. Redgment; lighting equipment, Thorn Electrical Industries Ltd.; installation by Mann, Egerton & Co. Ltd.)



Barclays Bank, London Airport

Above: This bank is located just inside the main entrance to London Airport on the Staines Road. The lighting was planned to be in keeping with the interior where unnecessary ornamentation has been avoided. Tungsten lamp fittings are used; 300-watt general diffusing fittings over the public area and 200-watt recessed fittings over and behind the counters. The average illumination is 20 lm/ft². (Architects, Durnford Parker and Partners; lighting equipment, General Electric Co. Ltd.; installation by Locke and Soares Ltd.)

National Bank of Scotland, Glasgow

The true ceiling of this bank is divided by heavy beams. In relighting it was decided to fill up the areas so made by a Lumenated ceiling to bring the ceiling in effect flush with the bottoms of the beams. The top picture shows the bank before relighting. (Architect, A. Pye, LRIBA; lighting equipment, Lumenated Ceilings Ltd.; installation by James Kilpatrick and Sons, Ltd.)

Trade Literature

AEI LAMP AND LIGHTING CO., LTD., 18, Bedford Square, London, W.C.1.—A well-illustrated catalogue describing the new range of "Satina" fittings designed for domestic use, including price list.

BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION, 2, Savoy Hill, London, W.C.2.—A useful loose-leaf folder entitled "Electrical Data for Architects." The folder comprises a collection of data sheets which appear from time to time in the advertisement pages of the architectural Press and gives valuable detailed information on various types of electrical installations and equipment.

CLARKE, CHAPMAN AND CO., LTD., Victoria Works, Gateshead, 8, Co. Durham.—Publication 114B, giving details of various types and sizes of "Brytal" aluminium and silvered glass reflectors.

COURTNEY, POPE (ELECTRICAL) LTD., Amhurst Park Works, Tottenham, London, N.15.—Comprehensive catalogue with separate price list illustrating fully fluorescent and tungsten fittings, cold cathode lighting, neon signs, luminous and modular ceilings, louvres and a flexible lighting grid. Including also several recent installations.

CRYSELCO LTD., Kempston Works, Bedford.—Illustrated leaflet describing the new "Homelite" fittings.

EKCO-ENSIGN ELECTRICAL LTD., Preston House, 45, Essex Street, London, W.C.2.—New lighting catalogue giving full details with separate price list of the standard ranges of industrial and commercial fittings together with information on the new range of coloured plastic end plates for diffuser fittings.

HAILWOOD AND ACKROYD LTD., 18, Lowndes Street, London, S.W.1.—Fully illustrated catalogue giving details and prices of the recently introduced "Satina" range of pendant lighting fittings available in pink and white satin-etched opal.

HOLOPHANE LTD., Elverton Street, London, S.W.1.—Publication 5701 giving details of the new optical louvre system "Holoflux" for the scientific control of tubular fluorescent sources. This leaflet also describes the "Lumiplex" plates used which are injection-moulded with unique conical prisms.

LIGHTING PRODUCTS INC., P.O. Box 338, Highland Park, Illinois, U.S.A.—Fully illustrated catalogue giving details of the "Optic-Lux" lighting systems, louvre panels, formed vinyl panel ceilings, the "Thin-Lite" luminaire, together with several new plastic troffers.

SYLVANIA ELECTRIC PRODUCTS INC., 1,740, Broadway, New York, 19, N.Y., U.S.A.—Three new publications, the first entitled "Incandescent Lighting Guide Book" is a 24-page booklet designed to provide a convenient source of reference on the incandescent light bulb for commercial, industrial and domestic use. The second entitled "Bright Ideas for Brighter Living" is a 16-page booklet on home lighting, including sections on exterior as well as interior lighting and shows pictorially and in sketches ways to brighten living spaces and achieve decorative effects as well as special lighting ideas. The third is a four-page brochure giving details on the construction and characteristics of the new "Sylvania Panelescent Lamp."

FREDK. THOMAS AND CO. LTD., Everton Buildings, Stanhope Street, London, N.W.1.—Progress Sheet L giving details and prices of tube pendants and ceiling fittings available in satin and gloss opal. Also Progress Sheet H describing with prices further opal pendant fittings.

TROUGHTON AND YOUNG (LIGHTING) LTD., The Lighting Centre, 143, Knightsbridge, London, S.W.1.—Illustrated brochure giving details and prices of the recently introduced "Harlequin" range of domestic lighting fittings.

J. A. WILSON LIGHTING AND DISPLAY LIMITED, 280, Lakeshore Road, Toronto, 14, Canada.—Catalogue 5-1 illustrating fully the "Luve-Tile" illuminated ceiling in polystyrene plastic including specifications, basic elements, how to instal, plan and maintain, together with photographs of several new installations.

Lighting Abstracts

For the benefit of those wishing to obtain articles mentioned in "Lighting Abstracts" the following list gives the full title of journals referred to and the addresses at which they are published. The addresses given are believed to be correct but no guarantee in this respect can be given.

All articles or papers abstracted are understood to be generally available. Unless otherwise stated in the abstract the language in which the article or paper is written is English.

Copies of articles or papers cannot be supplied from the offices of *Light and Lighting*.

Bull. Soc. Franç. Elect.	*Bulletin de la Société Française des Electriciens*, 8-14, Avenue Pierre Larouse, Malakoff (Seine), France.
Bull. Assoc. Suisse Elect.	*Bulletin de l'Association Suisse des Electriciens*, Seefeldstrasse 301, Zürich 8, Switzerland.
Byggmästaren	*Byggmästaren*, Kungsgatan 32, Stockholm, Sweden.
Electrical Construction and Maintenance	*Electrical Construction and Maintenance*, 330, West 42nd Street, New York 36, New York, U.S.A.
Elektro-Post	*Die Elektro-Post*, Verlagsort (13b), Mindelheim, Germany.
Elektrotech. Zeits. (B)	*Elektrotechnische Zeitschrift (Ausgabe B)*, Brillerstrasse 99, Wuppertal - Elberfeld, Germany.
Elettrotecnica	*Elettrotecnica*, Associazione Elettrotecnica Italiana, Via S. Paolo 10, Milan, Italy.
Illum. Engng.	*Illuminating Engineering*, The Illuminating Engineering Society, 1860, Broadway, New York 23, New York, U.S.A.
Int. Ltg. Rev.	*International Lighting Review*, P.O. Box 784, Amsterdam, Netherlands.
J. Opt. Soc. Am.	*Journal of the Optical Society of America*, American Institute of Physics, 57, East 55th Street, New York 22, New York, U.S.A.
Lichttechnik	*Lichttechnik*, Eichborndamm 141-167, Berlin-Borsigwalde, Germany.
Ljuskultur	*Ljuskultur*, Sveavagen 28-30, Stockholm, Sweden.
Lux	*Lux*, 108, Rue Denfort Rochereau, Paris (VIIIe), France.
Philips Res. Rep.	*Philips Research Reports*, Century House, Shaftesbury Avenue, London, W.C.2.
Rev. gen. Elect.	*Revue Générale d'Electricite*, 12, Place Henri-Bergson, Paris (VIIIe), France.
Trans. Illum. Eng. Soc. (London)	*Transactions of the Illuminating Engineering Society*, The Illuminating Engineering Society, 32, Victoria Street, London, S.W.1.
Trans. S. African Inst. Elect. Engrs.	*Transactions of the South African Institute of Electrical Engineers*, Kelvin House, Marshall and Holland Streets [P.O. Box 5907], Johannesburg, South Africa.

National Illumination Committee of Great Britain*

Report for the Year 1956

At the annual general meeting, held in January, the elections of officers were held to cover the period until after the next meeting of the International Commission on Illumination. All members were invited to submit nominations and the Committee of Administration was asked to coordinate the nominations received with any which it might wish to put forward. Voting at the meeting was by ballot and the names of officers elected are given in the list forming part of this report. In addition, Mr. W. J. Jones, Mr. J. F. Stanley and Dr. W. S. Stiles were elected to join the chairman, treasurer, secretary, Mr. J. G. Holmes (for the IES), Mr. G. T. Winch (for the IEE) and Mr. A. G. Higgins (for the IGE) as members of the Committee of Administration. The following were elected to membership of the CIE Panel: Dr. W. E. Harper, Mr. A. G. Higgins, Mr. J. G. Holmes, Dr. R. G. Hopkinson, Mr. A. P. Pott, Mr. M. D. Stonehouse, Mr. J. M. Waldram, Mr. H. C. Weston and Professor W. D. Wright. The auditors were: Mr. C. Harper and Mr. A. H. Olson.

Representation on the committee has been increased by the addition to the Co-operating Organisations of the Independent Lamp Manufacturers' Export Group, which has nominated Dr. J. W. Strange as its representative. The following changes in membership have taken place. Mr. J. Kemp of the Air Ministry has taken the place of Mr. Stafford, whilst Mr. Litchfield of the Ministry of Transport and Civil Aviation has been replaced by Mr. J. B. Selway. The National Coal Board has nominated Mr. R. Buffry in place of Mr. Strachan, and the Association of Public Lighting Engineers is now represented by Mr. N. Boydell and Mr. H. Carpenter in place of Mr. E. Howard and Mr. C. C. Smith.

The proceedings of the 1955 session of the International Commission on Illumination have been issued in three volumes. The first two contain the secretariat reports, papers, recommendations and minutes of meetings, arranged by subject, whilst in the third volume the recommendations only are reproduced in the three official languages. Sixty-two sets of the proceedings have been distributed in this country, 24 of them to university and other libraries.

Consideration has been given to the sub-committees which will be entrusted with the task of dealing with the technical work in preparation for the next meeting of the commission in 1959. In the first place, the committee agreed on the list of the chairmen of these sub-committees, of which there is one for each subject on the present programme of the commission. Then for those subjects for which the commission had already decided that the technical work should be carried out by working committees, nominations by the appropriate sub-committees were co-ordinated by the CIE Panel before being finally considered for approval by the committee. The commission has now appointed the working committees, and it is gratifying to record that four

* The N.I.C. is affiliated to the International Commission on Illumination. This report was approved at the annual general meeting of the committee held on Thursday, January 31, 1957.

Constitution of Committee, December 31, 1956

Officers :—

Chairman: Dr. S. English.
Vice-Chairmen: W. R. Stevens, H. C. Weston.
Hon. Treasurer: E. B. Sawyer, Lighting Service Bureau, 2 Savoy Hill, W.C.2.
Hon. Secretary: L. H. McDermott, National Physical Laboratory, Teddington, Middlesex.
Representatives of Great Britain on the Executive Committee of the International Commission on Illumination: A. G. Higgins, H. C. Weston.

Nominated by the Sponsoring Organisations :—

Illuminating Engineering Society: G. F. Cole, J. G. Holmes, E. C. Lennox, L. H. McDermott, J. M. Waldram.
Institution of Electrical Engineers: C. W. M. Phillips, H. R. Ruff, W. R. Stevens, Dr. J. W. T. Walsh, G. T. Winch.
Institution of Gas Engineers: J. B. Carne, A. G. Higgins, F. C. Smith, D. M. Thompson, W. H. Welch.

Nominated by the Co-operating Organisations :—

Admiralty: H. A. L. Dawson.
Air Ministry: J. Kemp.
Association of Public Lighting Engineers: N. Boydell, H. Carpenter.
British Electrical and Allied Manufacturers' Association: J. M. H. Stubbs.
British Electrical Development Association: V. W. Dale.
British Plastics Federation: Dr. W. E. Harper.
British Standards Institution: J. F. Stanley.
British Transport Commission: A. H. Cole (*British Railways*), H. E. Styles (*London Transport Executive*).
Central Electricity Authority and its Area Boards: R. Birt, M. D. Stonehouse.
Department of Scientific and Industrial Research: Dr. W. S. Stiles (*National Physical Laboratory*), W. Allen, Dr. R. G. Hopkinson (*Building Research Station*).
Electric Lamp Manufacturers' Association: L. J. Davies, W. J. Jones, E. B. Sawyer.
Electric Light Fittings Association: W. E. J. Drake, D. L. Tabraham.
Electrical Contractors' Association: A. H. Olson.
Gas Council: J. B. Carne, F. W. Sansom.
Glass Manufacturers' Federation: Dr. E. Preston.
Independent Lamp Manufacturers' Export Group: Dr. J. W. Strange.
Institution of Municipal Engineers: C. Harper.
Medical Research Council: Dr. W. J. W. Ferguson, H. C. Weston.
Ministry of Education: H. E. Dance, A. P. Pott.
Ministry of Fuel and Power: J. Cowan, H. Robinson.
Ministry of Health: D. A. Hughes.
Ministry of Labour and National Service: M. A. McTaggart.
Ministry of Supply: E. S. Calvert, F. McGinnety, J. L. Russell.
Ministry of Transport and Civil Aviation: Dr. H. F. Gillbe, W. Hadfield, J. B. Selway.
Ministry of Works: W. E. Rawson-Bottom.
National Coal Board: R. Buffry, P. N. Wyke.
Nuffield Foundation: J. Musgrove.
Post Office: A. E. Penney.
Society of British Gas Industries: S. F. Baker, P. C. Sugg.
Society of Glass Technology: Dr. S. English.

nominees of the committee have been appointed chairmen, whilst nine will act as members. The list included in this report gives the relevant details. (A correspondent is kept informed of the activities of the working committee.)

The first number of the CIE Bulletin was issued in February; this is a successor to the series of "Halath" and "Harath" letters, and it gave in the three languages details of the commission's activities.

The committee has proposed to the Japanese National Committee, as Secretariat for the Measurement of Light, that the National Physical Laboratory be asked to undertake the international intercomparison of fluorescent lamps, with measurements of both intensity and colour, as agreed at the CIE session in 1955. To this the Japanese have agreed, and the Laboratory has accepted the responsibility of organising the necessary work.

It is of interest to note that the following British Standards have been issued in a revised form: BS 161: 1956 Tungsten filament general service lamps; BS 941: 1956 Automobile filament lamps; BS 1853: 1956 Tubular fluorescent lamps for general lighting service. The Code of Practice CP 1004, Part 2, dealing with the lighting of roads other than traffic routes, has also been published.

S. ENGLISH,
Chairman.

L. H. MCDERMOTT,
Secretary.

CIE ref.	Subject (W–Working Committee; S–Secretariat)	Secretariat Country	W.C. Nominee C–Chairman M–Member Co–Correspondent	N.I.C. Sub-committee	Chairman
1.1	W (*a*) Definitions; (*b*) Vocabulary	Switzerland	Mr. R. G. Horner (M)	BSI LGE/2	Mr. R. G. Horner
1.2	S Measurement of light	Japan	—	Photometry	Mr. G. T. Winch
1.3.1	W Colorimetry	U.S.A.	Prof. W. D. Wright (M)	Colorimetry	Prof. W. D. Wright
1.3.2	W Colour rendering	Germany	Dr. B. H. Crawford (M)		
1.3.3	W Colour of signal lights	Great Britain	Mr. B. Boorman (C)	BSI LGE/17	Mr. J. L. Russell
1.4.1	S Photopic and scotopic vision	U.S.S.R.	—	Vision	Dr. W. S. Stiles
1.4.2	W Visual performance	U.S.A.	Mr. H. C. Weston (C)		
2.1.1	S Sources of visible radiation	Sweden	—	Light Sources	Mr. H. R. Ruff
2.1.2	W Sources of u.v. and i.r. radiation and measurement	Germany	Mr. H. R. Ruff (M)		
3.1.1.1	W Pre-determination of illumination and luminance	France	Mr. J. G. Holmes (Co)	Lighting Principles	Mr. J. M. Waldram
3.1.1.2	W Causes of discomfort in lighting	U.S.A.	Dr. R. G. Hopkinson(M)		
3.1.1.3	W Pleasantness in lighting	Netherlands	Mr. H. C. Weston (Co)		
3.1.2	S Home lighting	Denmark	—	Home Lighting	Mr. E. B. Sawyer
3.1.3	S School and office lighting	Finland	—	School and Office Light'g	Mr. A. P. Pott
3.1.4	S Industrial lighting (excluding mines, including lighting in hazardous situations)	Czechoslovakia	—	Lighting Practice	Mr. H. C. Weston
3.1.5	S Mine lighting	Belgium	—	Mine Lighting	Mr. D. A. Strachan
3.1.6	S Lighting of public buildings	Italy	—	Lighting of Public Bldgs.	Mr. W. E. Rawson-Bottom
3.1.8	S Lighting for selling	S. Africa	—	Lighting for Selling	Mr. A. H. Olson
3.1.9.2	S Lighting for photography, cinema, television production and theatre stages	Great Britain	—	Lighting for Photography, etc.	Mr. W. R. Stevens
3.2	W Daylight	Australia	Mr. P. Petherbridge (M)	Daylight	Mr. W. Allen
3.3.1	W Street lighting	Great Britain	Mr. J. M. Waldram (C)	BSI LGE/5	Dr. J. W. T. Walsh
3.3.2.1	W Aviation ground lighting	Netherlands	Mr. E. S. Calvert (C)	BSI LGE/4	Mr. J. L. Russell
3.3.2.2	S Lighting for transport other than automobile and air	Norway	—	Railway & Dock Lighting, etc.	Mr. A. J. Bull
3.3.3	W Airborne lighting and signals	U.S.A.	Mr. P. F. Cook (M)	Aircraft Light'g	Mr. J. L. Russell
3.3.4	S Lighting for indoor & outdoor sports	Brazil	—	Sports Lighting	Mr. M. W. Peirce
3.3.5	W Automobile headlights and signal lights	Netherlands	Dr. J. H. Nelson (M)	Automobile Lighting	Dr. J. H. Nelson
3.3.7	W Signal lights	France	Mr. H. J. N. Riddle (M)	BSI LGE/12	Mr. H. J. N. Riddle
4.1.1	W Education in schools, etc.	Switzerland	Mr. H. E. Dance (Co)	Lighting Education	Mr. A. G. Higgins
4.2	S Lighting legislation	Israel	—	IES Code Committee	Dr. W. E. Harper
—	Floodlighting and advertizing signs	—	—	Floodlighting	Mr. C. C. Smith
—	Hospital lighting	—	—	Hospital Ltg.	Dr. J. W. Ferguson

I.E.S. ACTIVITIES

London

Following the annual general meeting of the Society on May 14 a lecture on "Changing Tastes in Design" was given by Mr. Paul Reilly, Deputy Director of the Council of Industrial Design.

Mr. Reilly pointed out at the beginning of his talk that industrial design, particularly in the lighting industry, is inseparable from architecture. In a lively period of design all arts and industries move forward more or less in step. Our own eighteenth century was the perfect example of a consistent period; it would be hard to select from that century one art or craft as the pacemaker, other than the all-embracing art of architecture. In that century, too, design was still developing, each generation adding to what had gone before and scarcely giving any thought to reproducing the successes of the immediately preceding centuries.

This fine tradition of experiment and development petered out towards the middle of the nineteenth century, with the result that many of the technical inventions of the Victorians reached the market aping something that had gone before. Gas and electricity both in turn suffered from this kind of camouflage. Not until the modern movement in architecture got under way in the early years of the twentieth century was industrial design liberated from preconceived notions. But the modern movement, being in part a protest against late Victorian opulent ornament, started by wiping the slate almost too clean. The first phase of modern architecture was square, spare and bare, severely puritanical and rigidly functional. Lighting followed suit. The frosted football of the 1930s exactly expressed this elimination of all emotion, with the result that the ordinary person found modern lighting acceptable only for the working parts of the home, for bathroom or kitchen, but clung to the older conventions for the other rooms. In those days there was a wide and unbridgeable gap between the ideas of the few and the instincts of the many.

Many architectural styles have started simply, have matured elegantly and have ended richly. The modern movement does not look like being an exception. The Festival of Britain marked the turning point in this country from the first to the second phase. Even the grammar of criticism points the change. Early modern buildings would be described as bold, plain, simple or functional. Present-day modern buildings are more likely to attract adjectives such as light, elegant, colourful or patterned—even the word pretty is no longer taboo.

This development has taken the sting or commercial risk out of modern design, since the mellowing of the tastes of modern designers has gone far towards bridging the gap between their ideas and the conventional tastes of the public. Designers of electric light fittings have been quick to exploit this relaxation of the modern idiom, with the result that, along with furniture designers, textile artists and the modern architects themselves, they are able to offer designs for a modern interior that can satisfy a very wide section of the public. There is far less incentive to perpetuate Adam sconces and electrified wicks and wax now that the fun has been put back into function.

But liberation runs its own risks. The great and increasing popular following for modern or contemporary design has produced a breed of opportunists in many industries who, seeing profit in progress, have equated novelty with "contemporary" and have in many sectors of industry confused design with fashion, to such an extent that in furniture, fabrics and even light fittings "repro-contempo" not "repro-jaco" is now the menace.

With the ball at their feet and the rainbow at their beck and call modern designers and their employers must beware the pitfalls of ephemeral fashion. If they do not take care a revulsion may set in against all expressions of twentieth-century design, and the misled public may be forced again to take refuge in the past. That is why a permanent *selective* exhibition like "The Design Centre" offers such a useful and necessary service to-day; it is not to-day a matter so much of selecting the modern from the reproduction as selecting the good and the genuine from the second-rate imitation.

Sheffield Centre

The annual general meeting of the Sheffield Centre was held at the University, Weston Bank, Sheffield, on Monday, April 8. On conclusion of the formal business, the Hon. Secretary of the Society, Mr. J. G. Holmes, gave a talk based on the paper which he had presented in London on the lighting of London Airport.

The informal way in which Mr. Holmes presented his paper, during which he made personal comments on the installation, enabled members of the audience to understand more fully the different problems confronting the architects and designing engineers of such an immense project.

Mr. J. A. Whitaker opened the discussion with an appreciation of the interesting way in which the paper had been presented and with a question on the arrangement of the aircraft landing lights. A vote of thanks to the speaker was proposed by Mr. C. J. Chisholm.

At the recent annual lunch of the Liverpool Centre: (left to right) Mr. Cyril Washbrook, who gave an address, the Lord Mayor of Liverpool, the President and Mr. F. J. Burns, Chairman of the Centre.

Scottish and Northern Centres Meeting

The second joint week-end meeting of the Edinburgh, Glasgow and Newcastle Centres was held at Peebles on May 3 and 4, and the success of this venture equalled if not surpassed that of the 1955 meeting. President Dr. W. E. Harper opened the meeting in the Peebles Town Chambers Hall, and expressed his pleasure at the enterprise of the Scottish and Northern Centres in continuing with the project of such meetings and wished every success to the current venture.

Mr. P. S. J. Underwood, Chairman of Newcastle Centre, introduced the first lecturer, Mr. D. W. Durrant, who presented his paper, entitled "Decorative Lighting—The Designer's Approach," to a very appreciative audience. Discussion on the paper was led by Mr. E. C. Lennox and Mr. G. E. L. Comrie. Several other members of the audience, including the ladies, also joined in discussion,

Left: Dr. and Mrs. Harper and Miss Harper receiving Mr. L. C. Kalff.

Right: Dr. Harper, Mr. C. Couper (Hon. Sec., Edinburgh Centre) and Mr. R. Fothergill (Hon. Sec., Newcastle Centre) with Mr. James Brown.

Left to right, Mr. D. W. Durrant, Mr. P. S. J. Underwood (Newcastle), Dr. Harper, Mr. E. T. Radford (Glasgow), and Mr. E. Cassidy (Edinburgh).

Mr. A. W. Gostt, Mr. L. C. Kalff and Mr. G. F. Cole.

expressing their respective points of view and presenting the lecturer with a variety of questions. A vote of thanks to Mr. Durrant was proposed by Mr. E. Cassidy, Chairman of the Edinburgh Centre.

In the evening, an official reception was held in the ballroom of the Hydro Hotel when all guests were received by the President and Mrs. Harper. After dinner, the entire company enjoyed dancing in the ballroom until midnight and very much appreciated demonstrations presented by the Royal Scottish Country Dance Society.

On Saturday morning, a further meeting was held in the Chambers Hall when Mr. Radford, Chairman of Glasgow Centre, introduced the lecturer, Mr. L. C. Kalff, of Endhoven, Holland. Mr. Kalff presented a paper entitled "The Best Seeing Conditions During Work," and developed an interest in his audience which inspired most enthusiastic discussion, which was opened by Dr. R. G. Hopkinson, followed by Mr. J. S. McCulloch and many other members of the audience. Mr. L. C. Rettig proposed a vote of thanks to the lecturer, expressing full appreciation to Mr. Kalff for his lecture and the long journey which he had made to be present at the meeting.

Official proceedings were closed by Dr. Harper, who expressed his satisfaction of the entire meeting and thanked the members of the secretariat for the work which had culminated so successfully. The President also expressed the hope that these meetings should continue in the future as such association of centres developed both in strength and the interest in the society.

The remainder of the day was occupied by social activities and the company departed on their respective ways on Sunday morning from a meeting which would live long in the memory and which had been graced with the most favourable weather.

Birmingham Centre

At the meeting of the Birmingham Centre, held on March 22, Mr. Granville Berry read a paper entitled "Street Lighting from the City Engineer's Point of View."

Mr. Berry's great experience in the subject was obvious in his many searching remarks. He first of all dealt with developments in public lighting since the end of the last war; new and improved light sources have become available; lamp life had become doubled, and Great Britain leads the world in fluorescent lighting.

Local authorities understood the technical problem of street relighting, and the main difficulty was financial and administrative. The only financial assistance at present being given by the Ministry of Transport is towards the cost of bringing the lighting on the trunk roads up to the

standard laid down in the Code of Practice for Main Traffic Routes. In these cases a grant of 50 per cent. is made towards the initial and subsequent maintenance costs of approved installations. In all other cases of lighting improvements on classified and unclassified roads the lighting authority was bearing the full cost of the work.

Street lighting had, of course, some amenity value and assisted the police in protecting the ratepayers' property, but was still primarily a highways function, and its provision might reasonably be expected to attract improvement grants. Parish Councils and Rural District Councils were no longer the highways authority for the roads they have to light, and were generally finding it financially impracticable to carry out the work. The cost of even a minor scheme often imposed a heavy burden on local rates. Reorganisation of lighting authorities, said Mr. Berry, was not only urgent but long overdue.

Mr. Berry went on to discuss lighting by gas and electricity and the type and standard of lighting to be provided in the future. It was important to note the relationship between good lighting on main roads and the accident rate. Road accidents in this country are now said to be costing over £170 millions a year and at least on main traffic routes the price paid for providing the improved lighting was less than the cost of the accidents that would otherwise arise.

Although the achievement of the re-lighting programme to-day presents no serious technical problems, its carrying out did present a serious financial problem to nearly 75 per cent. of all lighting authorities concerned, and as a consequence progress was still only slow and accidents continued to grow year by year as traffic increased.

The contribution that good street lighting was making to safety on the roads was still not fully appreciated, and during the last few years lighting engineers, not only in this country but also in America, France and other Continental countries, had been seeking to establish some direct relationship between street lighting and road accidents.

Mr. Berry made much of the magnitude of the lighting facing lighting local authorities, and the cost it would add to the rates for even only a small scheme. He maintained that much could be done in this direction by the setting up of Joint Committees, each composed of members of constituent Local Authorities who would be concerned almost entirely with questions of co-ordination and planning rather than with administration, thus leaving with the Local Authorities concerned the actual carrying out of the day to day work that has to be done.

The Metropolitan area, comprising as it does twenty-nine separate Metropolitan Boroughs with closely built up fringe areas, not all of which are within the County of London, may present a special problem for which another Joint Metropolitan Board might provide the most economic and efficient administrative unit, particularly as in the London area over 80 per cent. of the street lighting maintenance is done by the Gas and Electricity Boards.

Liverpool Centre

At the March sessional meeting of the Liverpool Centre, a members' night in the form of a " Brains Trust " was held. The panel, under the chairmanship of Mr. C. C. Smith, consisted of Mr. H. Donaldson, Mr. N. Blackman, Mr. G. W. A. Illingworth and Mr. Forster.

Amongst the subjects discussed was the standardisation of bi-pin holders for all fluorescent tubular lamps. This was considered a retrograde step by Mr. Donaldson, who stated he had had sufficient trouble with 4 ft. bi-pin lamps. Some time was given to the seemingly never-ending subject of colour matching, when mention was made of various types of lamps and colour matching cabinets now available. The question as to whether the MBF/U lamps will eventually take the place of tubular fluorescent lamps for the medium and higher mounting installations in industry was thoroughly discussed. Many other interesting points, too numerous to mention, were also gone into.

A vote of thanks to the panel was proposed by Mr. J. S. Buck.

At the meeting held on April 16, a paper was given by Mr. A. Wilcock entitled " The Domestic Electric Lighting Installation " on behalf of himself and Mr. T. Jones and Mr. W. B. Parkinson. It dealt statistically with the domestic lighting installation, taking into consideration the present stage of development and possibilities of improvement. Estimates were included as to the additional expenditure on the basic electrical installation and in running costs which are likely to be incurred through improvement.

Comparisons were given on average lamp wattages and electricity costs covering the period 1937/1957. Slides were shown of home lighting installations in which very little thought had been given to design of fitting or lay-out, followed by further slides showing planned home lighting installations. Mr. Wilcock, who had also brought along a considerable quantity of equipment, gave demonstrations on pelmet, shelf and other forms of home lighting. The lecture concluded with a statement on the need for an electrical installation which permitted additions and amendments to be made quickly, easily and cheaply.

A lively discussion followed, opened by Mr. St. John Barrie, when members' questions were answered by Mr. Wilcock from the lighting engineer's angle, Mr. Jones from the contracting angle, and Mr. Parkinson from the electricity supply angle. The vote of thanks to the authors was proposed by Mr. N. Blackman.

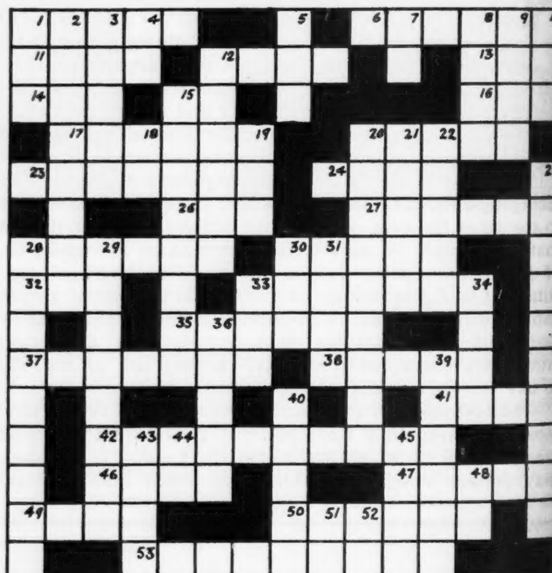
POSTSCRIPT By "Lumeritas"

IN a recent issue of *The Optician* its editor wrote: "It is becoming increasingly apparent that in order to fulfil their obligations to the people who seek advice on vision and the eyes, opticians should have more than a nodding acquaintance with the essentials of light and lighting. Modern trends in lighting design and techniques demand close study. Recent advances show that opticians cannot afford to be left behind in a science so closely allied to their own." These are words of wisdom and I hope they will be taken to heart by ophthalmic opticians. The editor of *The Optician* might now do his readers the further service of telling them that they are unlikely to be left behind in the science of light and lighting if they become regular readers of *Light and Lighting.*

THE University Grants Committee has recently made a report on university development in this country during the period 1952-56. The report mentions that some science laboratories are outmoded while others are still housed in emergency huts built in the 1914-18 war. Scientific research has sometimes to be done in ill-lit basements and cupboards. Now, shortage of suitable buildings is easier to understand than shortage of suitable lighting in such interiors as have to be utilised to accommodate the ever-growing number of students. There should be, and surely need be, no bad lighting in our universities. Even bad buildings can be well lighted without prohibitive cost.

THE widespread changeover from bare incandescent to bare fluorescent lamps has done little or nothing to make the bare lamp "system" of shop window lighting less objectionable. Apart from its inefficiency and vulgarity, it is glaring to passers-by as well as being potentially dangerous, in so far as shop windows with visible bare fluorescent lamps at low levels are distracting to vehicle drivers. The Woolwich Borough Council is sufficiently concerned about this bad lighting practice to have asked the Metropolitan Boroughs Standing Joint Committee to take action about it. It will be in the shopkeepers' own interest if something can be done to put an end to this practice.

No more comment for the present: here is a crossword instead, for readers' amusement.



ACROSS

1 Spread out.
6 Short and sharp.
11 Lighting unit.
12 So very humble.
13 Never in a sale yet never out of sale.
14 Who is your heart's delight?
15 To his horror, perhaps, the juror knows he has it even though it is in error.
16 He may be unreasonable but is not deprived of all reason.
17 Rumours do this.
20 Fleeter than flight, tho' it comes after: meeter than might, which it comes before.
23 Massed bands behind the lines?
24 Peaceful pause.
26 Briefly designated tho' important: is always 25, often 6, sometimes 12 down, perhaps involved in 28 across, usually happy with 13 (init.).
27 Poisonous vapour.
28 A little sort of sort?
30 A relative in the achromatic series?
32 Antecedent.
33 A steer or a steed might have done this.
35 Wherein were two gentlemen.
37 A Roman girl's name perhaps?
38 These may be static, twiddled or twirled.
41 'Twould be almost cruel to put the head at the tail.
42 Without exception of place.
46 More than anger.
47 Volta is most upset!
49 Even a liar may have this.
50 To give the lights an airing.
53 "You and I" can make it of mineral (anag.): it is mineral anyway.

DOWN

1 A bad good looker.
2 A frequency-changer, but not for your superhet.
3 A kind of looking glass.
4 Half of an adjective, but not much of adjective.
5 Always in siesta, yet active; always in fiesta yet seldom celebrating.
7 The Molotov vocabulary.
8 What a pretty girl may have on 16 across, or *vice versa.*
9 Maybe an idea, an area or even a few points.
10 Eastern monetary unit.
12 It sounds equinal.
15 Get back.
18 Religious denomination (init.)
19 Controls the flux.
20 Annul mice! (anag.)
21 Of the flank.
22 Stare wildly.
25 Hard to please.
28 Sight.
29 What would S. Claus do without his?
30 Away.
31 A kind of bad taste: 26 has it.
33 The last one decried concrete lamp columns. (init.)
34 Automobile brakes may be of this kind.
36 To choose or not to choose? That is the question. Ask a Frenchman.
39 Heavy wooden mallet.
40 Mark II is sufficient clue.
43 Trivial container.
44 Initials currently endemic in this country.
45 More than enough to paddle a boat.
48 This article is definitely not English.
51 Though silver-white some say it is the "yellow peril."
52 —— di ——!

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